SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Engineering in Manufacturing Engineering.

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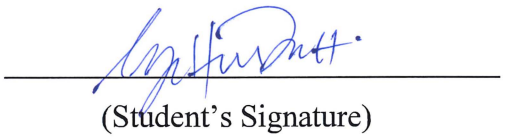
STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotation and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.



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OVERALL EQUIPMENT EFFECTIVENESS ANALYSIS OF POWER MAGNETIC INDUCTOR PRODUCTION LINE AT BI TECHNOLOGIES SDN. BHD.

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ABSTRAK

Overall Equipment Effectiveness (OEE) adalah salah satu. teknik matrik yang terbaik bagi prestasi pembuatan dalam pemerbadana penggunaan, hasil dan kecekapan proses, mesin dan kawasan penghasilan. Ia mengambil kira semua langkah-langkah penting dalam produktiviti. Satu kajian telah dijalankan untuk meningkatkan OEE yang sedia ada di BI Technologies Sdn Bhd bagi mengurangkan kerugian *downtime* yang tidak dirancang pada kegagalan peralatan dan kerosakan alat untuk memaksimumkan produktiviti. Sebelum memperolehi data bagi mengira nilai OEE yang sedia ada, produk atau proses yang mempunyai kerosakan tertinggi perlu dikenal pasti iaitu HA00-05587LFVT di kawasan *Power Magnetic Inductor.* Kaedah yang digunakan untuk menganalisis pelbagai sebab adalah Sebab dan rajah Kesan, untuk mencari punca yang mempengaruhi masalah yang berlaku di bahagian pengeluaran, Pareto Rajah untuk mencari masalah kritikal yang memberi kesan kepada bahagian pengeluaran, mengawal carta untuk mencari titik yg berada luar daripada garisan kawalan dan soalan 5W1H untuk memberi cadangan . Setelah mengetahui punca-punca pelbagai aktiviti yang membawa kepada kadar *downtime* tinggi, maka cadangan untuk penambahbaikan OEE dari OEE sedia ada iaitu 71,33% kepada 79,55% bagi kedua disemak OEE. Oleh itu, dari yang sedia ada untuk bertaraf dunia ranking OEE terdapat peningkatan dengan 11.52%. Untuk cadangan BI Technologies perlu melaksanakan dan mengawal dijadualkan penyelenggaraan mesin untuk mengurangkan kadar *downtime*, hal yg demikian sasaran hasil pengeluaran boleh mencapai.

ABSTRACT

Overall Equipment Effectiveness (OEE) is a powerful metric technique of manufacturing performance incorporating measures of the utilization, yield and efficiency of a process, machine or manufacturing line. It considers all important measures of productivity. A study was carried out to improve the existing OEE at BI Technologies SDN BHD by reduce unplanned downtime losses on equipment failures and tooling damage to maximize the productivity. Before obtaining the data to calculate the existing OEE value, the product or process that have highest defect need to be identified which is HA00-05587LFVT at Power Magnetic Inductor area. The methods used to analyze these various causes were Cause and Effect diagram, to find the cause affecting the problem that occurs on the production line, Pareto Diagram to find the critical problem that affect the production line, control chart to find the out of control point and 5W1H questions to proposed the recommendation. After knowing the causes of various activities that leads to high downtime rate, then recommendations for OEE improvements from existing OEE which is 71.33% to 79.55% for the second revised of OEE. Thus, from the existing to world class ranking OEE there are improvement by 11.52%. For the recommendation BI Technologies should implemented and monitor of planned scheduled for machine maintenance to decrease the downtime rate, so the production yield target can achieve.

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LIST OF SYMBOLS

$\bar{p}$	Average proportion nonconforming for many subgroups
np	Number nonconforming in a subgroup
n	Number inspected in a subgroup

LIST OF ABBREVIATIONS

OEE	Overall Equipment Effectiveness
TPS	Total Production System
VMI	Visual Mechanical Image
C&E	Cause and Effect
5W1H	What, where, who, when, why, how
SIRIM	Scientific and Industrial Research Institute of Malaysia
QAS	Quality Assurance System
DQS	Distributed Queuing System
CNC	Computer Numerically Control
ANC	Advanced Nodal Code
SOP	Standard Operating Procedure

CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Nowadays, manufacturing and assembly industries are facing ever-growing competitive for market place, globalization and environment situation. Thus, to meet the challenges in the situations companies need to maintain and improve their productivity and quality of product with reasonable price. Because of this current demand, many companies use Lean Manufacturing System and Toyota Production System (TPS) as a management tools to improve their productivity of product and quality of products. It is a systematic method to control and reduce cost by eliminating waste, improvements the quality and production, and reduction cost. It could be considered the best tool and technique to solve the problems in the short term and the long term in order to manufacture products in efficient way to improve in the production area.

Every company wants to be an effective and low-cost producer. As the market gets more competitive to demand quality product at best value, the inquisition of production capacity will be occurs. It is mean the quality point becomes more important in order to maintain the market shares and produce as many defect-free products as possible without having investment in new and costly of production equipment. Thus the companies need to maintain high level of productivity at lower cost by creating their quality product into each design and process. It is to ensure the quality is under control from beginning in the raw material processing until machining of product. To ensure production line continuously achieve higher level of effectiveness, companies especially in production department will eliminate the critical problems that will affect the line system.

BI Technologies Corporation Sdn Bhd is also known as TT Electronic was established by Allen Hilton since 1976 in Jalan Tanjung Api, Kuantan, Pahang. It is a public company listed in London FT stock exchange. The company was operated in global EMS in the United Kingdom, America, Europe, China, Japan, Singapore, Hong Kong, India and Malaysia. It is specializes for contract of manufacturing in low volume and high mix electronics of the aerospace and defense, medical, industrial and rail industries. Thus, the company becomes a supplier for world's leading manufacturers in the industries. Their main customers included Nexteer, Wabco, and AutoLiv.

During visit the power magnetic production line, there are few problems detected such as, low effectiveness of performance on production line inductor HA00-0558LFVT. It might affect the quality and productivity of production system. The production line is not fully automated which needed manpower to manually assemble the parts of product from starting process until packaging. Thus, tendency of defect to occur is high. After interviewed the line leader for this model, found that the operator lack of skills in handling the equipment and some of the operators are new workers. It is also have an operator needs to handle three machines. Therefore, it leads the tooling damaged and equipment failures.

1.2 PROBLEM STATEMENTS

Through the observation, it is found that there are a quite number of defect due to some factors at line production of HA00-05587LFVT which need to improve. Due to achieve the overall yield target, TT Electronics used manpower and machine to assemble the product. But there is high rate of equipment failure caused by tooling damage and machine breakdown and it is affect effectiveness of the production line system.

There are a few problem statements that need to take serious consideration for this research project which are:

i. Low of labor performance and effectiveness on production system.
ii. Downtime losses due to equipment failure and tooling damage.

iii. Process that cause higher rate of scraps and defects.

iv. Low quality of product with high level of scrap and defects.

1.3 OBJECTIVES

The objectives of this project research are stated below:

a) To check existing problem of poor effectiveness on production line.
b) To propose the effective way to reduced downtime losses on machine failure and tooling damaged.
c) To propose the effective way to reducing level of scrap and defect.
d) To propose OEE technique to increase the effectiveness of performance on the production line system.

1.4 RESEARCH SCOPE

The scope for this project research as follows:

a) Area of research: Power Magnetic Production Department of TT Electronics (BI Technologies Cooperation Sdn. Bhd.)
b) Study and analysis the performance of effectiveness on production line HA00-05587LFTV.
c) Collected data on the production line (machine downtime, production yield and reject data).
d) Improve the performance of effectiveness on the production line system by using Overall Equipment Effectiveness.

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